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AUTHOR Elmore, Patricia B.; Vasu, Ellen S.
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ABSTRACT

This study investigates the effect of attitudes toward mathematics-related coursework, previous mathematics coursework, student sex, spatial ability, and masculinity-feminity of interest pattern on statistics achievement. Subjects were 188 student volunteers from inferential statistics classes taught at a midwestern university during 1977-78. Instruments administered were the Masculinity-femininity Scale of the MMPI, Fennema-Sherman Mathematics Attitudes Scales, Attitudes Toward Feminist Issues Scale, five spatial visualization ability subtests of Factor-Referenced Cognitive Tests, and biographical data sheet. Sex differences were found on two of the mathematics attitude scales, for total points in the course, and on three of the five spatial visualization subtests. Regression analyses were performed to determine: (1) the amount of variance in statistics achievement accounted for by three theoretical models, and (2) the contribution of each variable set over and above the other variable sets in combination. (Author/MK)

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Math Anxiety: Its Impact on Graduate Level Statistics Achievement

Patricia B. Elmore

Southern Illinois University at Carbondale

Ellen S. Vasu

University of North Carolina at Chapel Hill

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Abstract

This study investigates the effect of attitudes toward mathematics-related coursework, previous mathematics coursework, student sex, spatial ability, and masculinity-femininity of interest pattern on statistics achievement. Subjects were 188 student volunteers from the inferential statistics classes taught at a midwestern university during 1977-1978. Instruments administered were Masculinity-femininity scale of the MMPI, Fennema-Sherman Mathematics Attitudes Scales, Attitudes Toward Feminist Issues Scale, five spatial visualization ability subtests of Factor-Referenced Cognitive Tests, and biographical data sheet. Sex differences were found on two of the mathematics attitude scales, for total points in the course, and on three of the five spatial visualization subtests. Regression analyses were performed to determine (a) the amount of variance in statistics achievement accounted for by three theoretical models and (b) the contribution of each variable set over and above the other variable sets in combination.

Math Anxiety: Its Impact on Graduate Level Statistics Achievement

The statistical techniques taught in an inferential statistics class are tools to be used in research and in the discovery of new facts. Many students enrolled in statistics classes at various universities have expressed great concern about the course due to their inadequate mathematical background. It is likely that such students have previously found mathematics difficult and disagreeable. When the students realize that the course is concerned with numbers, formulae, and arithmetic operations, they fear that the subject is complex and abstract.

Paul Blommers and E. F. Lindquist (1960), authorities in the field of statistical experimental design, stated, "Courses in statistical methods have been regarded as exceedingly difficult by a substantial number of students - even by many who have achieved a high level of success in other aspects of their professional work."

N. M. Downie and R. W. Heath (1970), in their textbook on basic statistical methods, stated, "It is probable that many students using this text may have found mathematics unpleasant or difficult in the past."

In Statistical Methods in Education and Psychology, Gene V. Glass and Julian C. Stanley (1970) stated, "If you have not studied mathematics, logic, or any other rigorous and deductive body of knowledge for some time, you may find studying statistics uncomfortable for a while."

A number of authorities in statistics suggest that the difficulties encountered by many students enrolled in courses in statistical methods may be attributed to a lack of practice in precise and rigorous thinking and to inadequate mathematical training.

Two recent studies have been conducted to determine the variables that affect success in statistics. Morris, Kellaway, and Smith (1978) found Mathematics Anxiety Rating Scale scores to be higher for psychology students enrolled in introductory statistics classes than for mathematics students enrolled in mathematics classes and to be inversely related to performance in introductory statistics for the psychology students. Stepwise multiple regression was used in a study by Kodras and Prather (Note 1) to determine the relationship between final letter grade assigned in selected statistics courses and student academic and personal characteristics (major field, scholastic ability examination scores, GPA, age, sex, race, and veteran status). The multiple correlation squared (R^2) for the six selected graduate statistics courses ranged from .28 for advanced statistical inference in business administration to .57 for applied statistics with an R^2 of .46 for psychological statistics.

Numerous studies have been conducted on sex differences in mathematics achievement and attitudes. While some studies have failed to find significant sex differences (Jacobs, 1974; McClure, 1971; Merkel, 1974; Roberts, 1970), other studies have reported differences favoring boys over girls at the junior-high level and beyond (Hilton & Berglund, 1974; Keeves, 1973; Nevin, 1973; Simpson, 1974). One limitation of previous work is that the majority of the data has been gathered on children at the elementary or secondary level and little research has been conducted

at the college level (Ernest, 1976). A second limitation is the discrepancy between researchers on the definition of mathematical ability as algebraic, geometric, computational, or spatial visualization ability.

Many of the concepts introduced in an inferential statistics course are visual. For example, at some point in any inferential statistics course, the bivariate normal distribution and its associated properties must be presented. Maccoby and Jacklin (1974) report that males tend to score higher than females on tests measuring spatial visualization. However, Fennema and Sherman (1977) and Sherman and Fennema (1978) found that males were not superior to females in mathematics achievement, mathematical problem solving or spatial visualization (Differential Aptitude Test).

When attitudes toward mathematics are used as predictors of achievement in mathematics, a low but significant correlation is usually found (Neale, 1969). This finding is consistent for students at all academic levels from elementary to postgraduate (Burbank, 1970; Callahan, 1971; Crosswhite, 1972; Edwards, 1972; Evans, 1972; Fenneman, 1974; Mastantuono, 1971; Moore, 1972; Spickerman, 1970; Webb, 1972; Whipkey, 1970; Wilson, 1973), for students in other countries (do Carmo de Avila & Gillet, 1970; Kulkarni & Naidu, 1970), and for minority groups in the United States (Jackson, 1974). One would expect that a student's attitude toward mathematics would be important in determining whether he elects to take courses in mathematics, engage in mathematical activities, and persevere in these efforts once he has begun (Aiken, 1972). Many of the students enrolled in introductory statistics courses fear all types of computations from word problems, percentages, charts, and graphs to any type of

quantitative data. It would seem that this fear of mathematics could generalize to fear of statistics and thus interfere with an individual's progress in statistics achievement.

The recent interest in math anxiety clinics (Stent, 1977; Tobias, 19[illegible]) began out of concern for the absence of women in mathematics classes at both the high school and undergraduate level. In 1973, at the University of California at Berkeley, 8 percent of the women had taken four years of high school math as compared to 57 percent of the men. In addition, at that institution a significant relationship was found to exist between departments having a one year college mathematics requirement in the curriculum and having less than one third of the degrees in the department awarded to women (Sells, 1973).

Sex role is one of the personality variables related to attitude toward and performance in mathematics (Aiken, 1970; Elton & Rose, 1967). Lambert (1960) found the mean Masculinity-Femininity score on the MMPI of female mathematics majors was significantly more feminine than that of female education majors, whereas there was no difference between the mean scores of male education and mathematics majors.

The purpose of this study was to investigate the effect of attitudes toward mathematics-related coursework, previous mathematics coursework, mathematics ability, spatial ability, and masculinity-femininity of interest pattern on the achievement in applied statistics of male and female students.

METHOD

Sample

The subjects for this study were 188 students enrolled

in inferential statistics classes at Southern Illinois University at Carbondale (SIU-C) during the fall semester of 1977 and the spring semester of 1978 who volunteered to participate in the study. The students were graduate students from numerous disciplines in the university, such as business, botany, forestry, zoology, political science, education, psychology, physiology, administration of justice, speech, and music.

Instruments

The instruments administered in this study were:

1. Masculinity-femininity scale of the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1967).
2. Fennema-Sherman Mathematics Attitudes Scale (Fennema & Sherman, 1976). The nine subscales are:
   a. Confidence in Learning Mathematics Scale
   b. Teacher Scale
   c. Usefulness of Mathematics Scale
   d. Mother Scale
   e. Attitude Toward Success in Mathematics Scale
   f. Effectance Motivation in Mathematics Scale
   g. Mathematics Anxiety Scale
   h. Father Scale
   i. Mathematics as a Male Domain Scale
3. Attitudes Toward Feminist Issues Scale (ATFI; Brodsky, Elmore, & Naffziger, 1976). The nine subscales are:
   a. Human Reproduction
   b. Child Care

c. Politics and Legislation

d. Employment

e. Overcoming Self-Denigration

f. Marriage and Family

g. Consciousness-Raising in the Media

h. Religion

i. Education

4. Spatial and Visualization subtests of the Kit of Factor-Referenced Cognitive Tests (Ekstrom, French, Harman & Dermen, 1976):

a. Card Rotations Test (S - 1)

b. Cube Comparisons Test (S - 2)

c. Form Board Test (VZ - 1)

d. Paper Folding Test (VZ - 2)

e. Surface Development Test (VZ - 3)

5. Biographic Data Sheet, which included:

a. Age

b. Sex

c. Previous mathematics-related coursework

(1) Number of years of high school mathematics

(2) Number of years of college mathematics

(3) Whether a statistics or probability course has been taken

d. Graduate major

The Fennema-Sherman Mathematics Attitude Scales include nine domain-specific, Likert-type scales measuring important attitudes related

to mathematics learning. The scale includes 108 items; six items worded negatively and six items worded positively are included on each scale. A high score indicates a positive attitude toward mathematics, and a low score indicates a negative attitude toward mathematics. A complete description of the development of the scales, as well as the scales themselves, may be found in Fennema and Sherman (1976).

The Attitudes Toward Feminist Issues Scale (AFTI Scale) is a 120 item test that measures attitudes toward nine issues identified with the women's liberation movement (Brodsky, Elmore, & Naffziger, 1976). These issues form the nine subscales of the ATFI Scale: Human reproduction, child care, politics and legislation, employment, overcoming self-denigration, marriage and family, consciousness-raising in media, religion, and education. Respondents indicate their agreement with each item on the ATFI Scale using a five-category rating scale from "Strongly Agree" to "Strongly Disagree". Strong agreement reflects a liberal feminist attitude and strong disagreement reflects a conservative feminist attitude.

Procedure

This study was conducted during the fall and spring semesters of the 1977-78 academic year. The students were administered the masculinity-femininity scale of the Minnesota Multiphasic Personality Inventory and the five subtests of the Kit of Factor-Referenced Cognitive Tests during a testing session as early as possible during the semester. At that session, the students were asked to complete the Fennema-Sherman Mathematics Attitudes Scales, the Attitudes Toward Feminist Issues Scale, and the Biographic Data Sheet at home and return them to their statistics instructor in one week. With the students' permission, their course and

examination grades (measures of statistics achievement) were obtained from their statistics instructors. The data was coded to maintain confidentiality, such that the students' identification was by an assigned number, and the students' names were deleted as soon as the data was coded.

Research Questions

1. Is there a significant difference between male and female students on the following variables:
   a. Math attitudes on the nine subscales and total score of the Fennema-Sherman Mathematics Attitudes Scales
   b. Attitudes on the nine subscales and total score of the Attitudes Toward Feminist Issues Scale
   c. Spatial visualization ability on five subtests of the Kit of Factor-Referenced Cognitive Tests
   d. Total points received in the statistics course
   e. Number of years of high school mathematics
   f. Number of years of college mathematics
   g. Masculinity-femininity score on the MMPI using the male scoring key for both sexes and then using the female scoring key for both sexes.
2. How much variance in statistics achievement can be accounted for by:
   a. Attitudes toward mathematics-related coursework
   b. Previous mathematics coursework
   c. Student sex
   d. Spatial ability

e. Masculinity-femininity of interest pattern

What is the contribution of each variable set over and above the contribution of the other four variable sets in combination?

Data Analysis

Research question one was answered for each of the seven dependent variables listed by conducting a one-way analysis of variance procedure using student sex as the independent variable. Part 1 of research question two was answered by using regression analysis and constructing a full model containing all the variable sets of interest and determining the R^2 value. Part 2 of research question two was answered by constructing restricted models dropping out one variable set in each model. The restricted models were tested against the full model to determine if the contribution of each variable set over and above the other variable sets in combination was significant.

RESULTS

Table 1 shows the means and standard deviations by sex of the following variables: (a) five spatial visualization subtests of the Kit of Factor-Referenced Cognitive Tests, (b) the nine subscale scores and total score on the Fennema-Sherman Mathematics Attitudes Scales, (c) the number of years of high school and college mathematics, (d) the male and female scores on the Minnesota Multiphasic Personality Inventory (MMPI), (e) the nine subscale scores and total score on the Attitudes Toward Feminist Issues Scale, and (f) the total number of points achieved in the statistics course. One-way analyses of variance were run to determine if there were sex differences on the above referenced variables.

Insert Table 1 about here

Men students received significantly higher mean scores than women on three of the five spatial visualization subtests (card rotations, cube comparisons, and form board tests). There was a significant difference between male and female students on two of the Fennema-Sherman Mathematics Attitude Scales. Women students had more positive math attitudes on the Attitude Toward Success in Mathematics Scale and on the Mathematics as a Male Domain Scale. Women received a significantly higher mean score than men on both the male and female scores on the Minnesota Multiphasic Personality Inventory. Women exhibited significantly more liberal feminist attitudes than men on all subscale scores except Human Reproduction and on the total score of the Attitudes Toward Feminist Issues Scale. Women received a significantly higher mean number of total points in the course than men.

The amount of variance in statistics achievement accounted for by (a) attitudes toward mathematics-related coursework, (b) previous mathematics coursework, (c) student sex, (d) spatial visualization ability, and (e) masculinity-femininity of interest pattern (measured by male and female scores on the MMPI) was .38. Spatial visualization ability and male, female scores on the MMPI made a significant contribution over and above the other four variable sets in combination (see Table 2).

Insert Table 2 about here

The amount of variance in statistics achievement accounted for by (a) attitudes toward mathematics-related coursework, (b) previous mathematics coursework, (c) student sex, (d) spatial visualization ability, and (e) masculinity-femininity of interest pattern measured by the subscale scores on the Attitudes Toward Feminist Issues Scale was .43. Spatial visualization ability and student sex made a significant contribution over and above the other four variable sets in combination (see Table 3).

Insert Table 3 about here

The amount of variance in statistics achievement accounted for by (a) attitudes toward mathematics-related coursework, (b) previous mathematics coursework, (c) student sex, (d) spatial visualization ability, and masculinity-femininity of interest pattern measured by (e) male and female scores on the MMPI and (f) subscale scores on the Attitudes Toward Feminist Issues Scale was .46. Spatial visualization ability, MMPI scores, and Attitudes Toward Feminist Issues Scale subscale scores made a significant contribution over and above the other five variable sets in combination (see Table 4).

Insert Table 4 about here

DISCUSSION

Several findings emerge from the analysis of sex differences:

1. Consistent with results reported by Maccoby and Jacklin (1974),

men students received significantly higher mean scores than women on three of the five spatial visualization subtests: card rotations, cube comparisons, and form board tests. There were no significant differences between men and women students on the paper folding and surface development subtests. This finding is in agreement with results reported by Fennema and Sherman (1977) and Sherman and Fennema (1978).

2. Women students had more positive math attitudes than men on the Attitudes Toward Success in Mathematics and on the Mathematics as a Male Domain subscales of the Fennema-Sherman Mathematics Attitude Scales. Also, women received a significantly higher mean number of total points in the course than men. These results may be due to the self-selection and high ability level of women enrolled in graduate school.

3. Women exhibited more liberal feminist attitudes than men on all subscale scores and on the total score of the Attitudes Toward Feminist Issues Scale. This same finding was reported with undergraduate men and women (Brodsky, Elmore, and Naffziger, 1976).

Multiple regression analysis was used to determine the relationship between statistics achievement and attitudes toward mathematics-related coursework, previous mathematics coursework, student sex, spatial visualization ability, and masculinity-femininity of interest pattern. The multiple correlation squared (R^2) was .38 when male and female scores on the MMPI were used to measure masculinity-femininity of interest pattern and .43 when the nine subscale scores on the ATFI were used. When both MMPI and ATFI were included in the full model, the R^2 was .46. The R^2 values are consistent with those reported by Kodras and Prather (Note 1).

When the effect of each variable set was analyzed over and above the other four variable sets in the theoretical model presented in Table 3, spatial visualization ability and student sex were significant. Results for the theoretical models presented in Tables 2 and 4 were similar. Analysis of the effect of each variable set over and above the other four variable sets in Table 2 showed spatial visualization and male and female MMPI scores were significant. The effect of each variable set analyzed over and above the other five variable sets in Table 4 indicated spatial visualization ability, MMPI scores, and ATFI subscale scores were significant.

In two theoretical models, sex role was found to be related to success in statistics. Elton and Rose (1967) also found that sex role was related to performance in mathematics. In all three theoretical models, spatial visualization ability was significant. This finding has implications for the development of visual materials for teaching statistics. Further research is planned to include other measures of mathematical ability, specifically algebraic and computational ability, in the theoretical model predicting achievement in graduate level statistics.

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Table 1
Means and Standard Deviations of Variables Within Variable Set

Variables	Male			Female			Overall		
	Mean	Standard Deviation	N	Mean	Standard Deviation	N	Mean	Standard Deviation	N
Spatial Visualization Ability on Kit of Factor-Referenced Cognitive Tests:									
Card Rotations Test[a]	104.26	28.92	99	91.64	25.25	85	98.43	27.93	184
Cube Comparisons Test[a]	25.80	6.92	99	22.98	7.59	85	24.49	7.35	184
Form Board Test[a]	121.11	39.93	100	102.83	38.79	84	112.77	40.35	184
Paper Folding Test	10.51	4.22	100	10.98	3.55	84	10.72	3.92	184
Surface Development Test	36.70	15.58	100	33.34	15.65	85	35.16	15.66	185
Attitudes Toward Mathematics-Related Coursework on Fennema-Sherman Mathematics Attitudes Scales:									
Confidence in Learning Math	42.68	9.82	98	41.50	11.29	84	42.14	10.51	182
Teacher	40.63	5.74	98	41.49	7.46	84	41.03	6.59	182
Usefulness of Math	46.48	6.73	98	47.31	7.15	84	46.86	6.92	182
Mother	39.94	5.31	98	41.45	7.50	84	40.64	6.44	182
Attitude Toward Success in Mathematics[a]	45.41	7.01	98	49.45	6.78	84	47.27	7.18	182
Effectance Motivation in Math	39.98	8.88	98	41.36	9.47	84	40.62	9.16	182
Mathematics Anxiety	39.22	9.90	98	37.36	11.77	84	38.36	10.81	182
Father	39.95	7.41	98	41.35	7.84	84	40.59	7.62	182
Math as a Male Domain[a]	50.90	7.55	98	53.57	6.02	84	52.13	7.00	182
TOTAL	385.19	45.76	98	394.83	57.62	84	389.64	51.65	182

[a]The difference between means for males and females was statistically significant at the .05 level of significance.

Table 1 (Continued)

Variables	Male Mean	Male Standard Deviation	Male N	Female Mean	Female Standard Deviation	Female N	Overall Mean	Overall Standard Deviation	Overall N
Previous Mathematics-Related Coursework:									
Years of High School Math	3.33	1.44	95	3.47	2.70	83	3.39	2.12	178
Years of College Math	2.21	1.74	97	2.13	1.95	83	2.17	1.83	180
Masculinity-Femininity of Interest Pattern:									
Male Score on MMPI[a]	28.49	4.42	99	34.64	5.77	85	31.33	5.93	184
Female Score on MMPI[a]	30.81	4.39	99	37.26	5.75	85	33.79	5.99	184
Attitudes on Attitudes Toward Feminist Issues Scale:									
Human Reproduction	12.57	4.81	98	11.33	4.07	83	12.00	4.52	181
Child Care[a]	11.51	4.66	98	10.01	4.25	83	10.82	4.53	181
Politics & Legislation[a]	33.29	10.05	98	26.70	6.91	83	30.27	9.33	181
Employment[a]	36.24	8.98	98	30.22	7.38	83	33.48	8.79	181
Overcoming Self-Denigration[a]	19.58	5.38	98	16.33	4.32	83	18.09	5.17	181
Marriage and Family[a]	45.27	12.03	98	39.66	8.22	83	42.70	10.79	181
Consciousness-Raising in the Media[a]	34.44	8.85	98	28.10	7.88	83	31.53	8.97	181
Religion[a]	28.40	9.85	98	23.53	7.64	83	26.17	9.21	181
Education[a]	57.80	18.85	98	44.93	14.37	83	51.90	18.08	181
TOTAL ATFI[a]	279.09	70.24	98	230.80	50.55	83	256.94	66.37	181
Statistics Achievement: Total Points Achieved in the Statistics Course[a]	483.29	106.46	86	532.34	80.84	76	506.30	98.14	162

[a]The difference between means for males and females was statistically significant at the .05 level of significance.

Table 2

Summary of Regression Analysis Using Five Variable Sets[a]

Model	Variable Sets Included In The Model	Variable Set Eliminated From The Model	R^2	Reduction in R^2	df	F
Full	1, 2, 3, 4, 5	None	.38323			
Restricted Model 1	2, 3, 4, 5	1	.29524	.08799	5,133	3.79[b]
Restricted Model 2	1, 3, 4, 5	2	.37349	.00974	1,133	2.10
Restricted Model 3	1, 2, 4, 5	3	.32679	.05644	9,133	1.35
Restricted Model 4	1, 2, 3, 5	4	.36227	.02096	3,133	1.51
Restricted Model 5	1, 2, 3, 4	5	.35298	.03025	2,133	3.26[b]

[a]The variable sets and the variables included in each set were:

Dependent Variable - Statistics Achievement: Total number of points achieved in the statistics course.

1. Spatial visualization ability: Scores on five subtests of Kit of Factor-Referenced Cognitive Tests measuring spatial and visualization abilities.
2. Student sex.
3. Attitudes toward mathematics-related coursework: Scores on nine subscales of Fennema-Sherman Mathematics Attitudes Scales.
4. Previous mathematics-related coursework: Number of years of high school mathematics, number of years of college mathematics, and whether a statistics or probability course had been taken.
5. Masculinity-femininity of interest pattern: Male score and female score of each student on the Masculinity-Femininity Scale of the Minnesota Multiphasic Personality Inventory.

[b]The reduction in R^2 was statistically significant at the .05 level of significance.

NOTE: This analysis was based on N = 154.

Table 3

Summary of Regression Analysis Using Five Variable Sets[a]

Model	Variable Sets Included In The Model	Variable Set Eliminated From The Model	R^2	Reduction in R^2	df	F
Full	1, 2, 3, 4, 5	None	.43235			
Restricted Model 1	2, 3, 4, 5	1	.36827	.06408	5,126	2.84[b]
Restricted Model 2	1, 3, 4, 5	2	.40582	.02653	1,126	5.89[b]
Restricted Model 3	1, 2, 4, 5	3	.39580	.03655	9,126	.90
Restricted Model 4	1, 2, 3, 5	4	.40240	.02995	3,126	2.22
Restricted Model 5	1, 2, 3, 4	5	.35345	.07890	9,126	1.95

[a]The variable sets and the variables included in each set were:

Dependent Variable - Statistics Achievement: Total number of points achieved in the statistics course.

1. Spatial visualization ability: Scores on five subtests of Kit of Factor-Referenced Cognitive Tests measuring spatial and visualization abilities.
2. Student Sex.
3. Attitudes toward mathematics-related coursework: Scores on nine subscales of Fennema-Sherman Mathematics Attitudes Scales.
4. Previous mathematics-related coursework: Number of years of high school mathematics, number of years of college mathematics, and whether a statistics or probability course had been taken.
5. Masculinity-femininity of interest pattern: Scores on nine subscales of Attitudes Toward Feminist Issues Scale.

[b]The reduction in R^2 was statistically significant at the .05 level of significance.

NOTE: This analysis was based on N = 154.

Table 4

Summary of Regression Analysis Using Six Variable Sets[a]

Model	Variable Sets Included In The Model	Variable Set Eliminated From The Model	R^2	Reduction in R^2	df	F
Full	1, 2, 3, 4, 5, 6	None	.46415			
Restricted Model 1	2, 3, 4, 5, 6	1	.41293	.05122	5,123	2.35[b]
Restricted Model 2	1, 3, 4, 5, 6	2	.45597	.00818	1,123	1.88
Restricted Model 3	1, 2, 4, 5, 6	3	.42451	.03964	9,123	1.01
Restricted Model 4	1, 2, 3, 5, 6	4	.44018	.02397	3,123	1.83
Restricted Model 5	1, 2, 3, 4, 6	5	.43240	.03175	2,123	3.64[b]
Restricted Model 6	1, 2, 3, 4, 5	6	.38236	.08179	9,123	2.09[b]

[a]The variable sets and the variables included in each set were:

Dependent Variable - Statistics Achievement: Total number of points achieved in the statistics course.

1. Spatial visualization ability: Scores on five subtests of Kit of Factor-Referenced Cognitive Tests measuring spatial and visualization abilities.
2. Student sex.
3. Attitudes toward mathematics-related coursework: Scores on nine subscales of Fennema-Sherman Mathematics Attitudes Scales.
4. Previous mathematics-related coursework: Number of years of high school mathematics, number of years of college mathematics, and whether a statistics or probability course had been taken.
5. Masculinity-femininity of interest pattern: Male score and female score of each student on the Masculinity-Femininity Scale of the MMPI.
6. Masculinity-femininity of interest pattern: Scores on nine subscales of Attitudes Toward Feminist Issues Scale.

[b]The reduction in R^2 was statistically significant at the .05 level of significance.

NOTE: This analysis was based on N = 153.